REMARKS

The Patent Office Examiner's rejection of Claim 29 under 35 USC §112 is noted. The informality has been corrected by canceling and re-writing the claim.

The rejection of Claims under 35 USC 102(e) as anticipated by Hait Publication No. 2002/0080436 is respectfully traversed. The Hait publication should be inapplicable because applicant has claimed priority of Provisional application (60/217,136) filed July 10, 2000.

Nevertheless, the Hait publication is inapplicable to the claims as now presented for the following reasons.

The Hait publication is inapplicable to Claims 1, 28, 29 and 35 because the 12n and 14n common throughout Hait's figures including Figure 2 as cited and Figure 24 were the Encoders and Decoders in accordance to his invention to create unique time delay for the delay domain multiplexer. A plurality of Hait's Encoders provided a unique delay (channel) for each input data sequence, while each transmitter data processor in the pending claims (New Claims 39, 66, 73) would multiplex L data channels into a spatial and a temporal data stream (page 18, lines 20-23).

Next, in paragraph 0210, Hait disclosed an embodiment (Figure 24) of his signal encoding decoding scheme. He described a design in using the uniqueness of time delay

associated with a pair of "double-pulsed" signals for creating channels to operate an apparatus 190, that he called a delay domain multiplexer. He further clarified that his delay-domain multiplexer operates in tandem with other apparatus (e.g., wave-division multiplexer and time-division multiplexer) to create channels.

After reading Hait's paragraph 0210 and examining his figures 2 and 24, it is clear to one with ordinary skill in the art that Hait was disclosing an Encoder and a new multiplexing scheme called delay domain multiplexer which was very different from the operation of the transmit data processor or the temporal and spatial data streams in the pending application (New Claims 39, 66).

Nor does Hait have a plurality of optical sources directly modulated by a plurality of data streams. Hait in paragraph 0105 had no description of 44. However, in paragraph 0104, Figure 3 (44) was referred to as an optical source for generating a photonic signal 46. Hait's invention, which pertained to the Encoder Figure 3 (50) for encoding parent signal to produce time-delayed daughter signals 48. For one of ordinary skill in the art, a general purpose optical source for producing time-delayed signals would have very different characteristics than an optical source used in the pending application (New Claims 39, 66) as claimed for fiber-optic communication, which has to follow industry and ITU guidelines

in terms of wavelength, line-width, jitter, noise and reliability for 24/7 types of operations.

The Examiner's reference to Hait as having a plurality of polarization modulators performing the function disclosed and claimed by applicant is misplaced. Hait's paragraph 0183 referred to encoding of signals that may contain a variety of known modulation types. Since Hait did not disclose any specific polarization modulator designs that resembles the pending application (New Claims 39, 66, 67), it is inapplicable (page 19, lines 6-16). Also, the Examiner's reference of Hait's wavelength division multiplexer turns out to be a delay-domain multiplexer. Hait's Figure 25 entitled "Compound Multiplexing with DDM External" shown a compound multiplexing systems in cascading known multiplexing schemes (e.g., WDM 214) with his invention of the delay-domain multiplexer using time-delayed daughter signals. Since no delay-domain multiplexer is used in the pending application (New Claims 39, 66, 67, 73), Hait is inapplicable.

Hait does not show an optical fiber cable referred to by the Examiner. There is no 30 in Figure 1 or in paragraph 0102 of Hait. However, in paragraph 101, 30 were referred to as a trunk carrying combined information from disparate encoder. Since Hait was referring to any known generic cables, Hait is not applicable to the specific interconnection of optical fiber cable in the pending application (Figure 1A).

Further applicant has no delay-domain demultiplexer the Examiner referred to in Hait. Figure 25 entitled "Compound Multiplexing with DDM External" shown a compound multiplexing systems in cascading known multiplexing schemes (e.g., wavelength division demultiplexer 216) with his invention of the delay-domain demultiplexer using time-delayed daughter signals. Since no delay-domain demultiplexer was used in the pending application (New Claims 39, 66, 67), this reference is inapplicable.

Hait certainly has no plurality of polarization demodulators applicable to the invention as claimed (New Claims 39, 66). There is no description of Figure 48 (422) in paragraph 310. Rather Figure 48 was described in details in paragraph 308. Hait disclosed two modulators (412, 418) in the transmit side but only one demodulator (422) in the receive side. Assuming the demodulator would perform inverse operation as the two modulators combined. According to Hait, the so-called preconditioning modulator would function by continually varying the value of a parameter used for modulation. Thus demodulator 422 would conduct the opposite. For one with ordinary skill in the art, this feature automatically eliminated most form of digital modulation, which does not require continuous change of parameters during the symbol time of the "1" and the "0" states. It also excluded multi-parameter modulation like polarization modulation using Stokes' parameters

{S0, S1, S2, S3}, which was used in the pending application (page 20, lines 13-16; also page 14, lines 13-22). Thus, Hait is inapplicable.

It also should be very clear to one of ordinary skill in the art the Hait's concept of photonic detection is not comparable to that disclosed and claimed by applicant (New Claims 39, 66). On page 14, line 18 of the pending application, a reference to the receiver implementation was given. From Figure 3 of the cited reference paper by Sergio Benedetto, "Multilevel Polarization Shift Keying: Optimum Receiver Structure and Performance Evaluation," HEEE Trans. On Comm., March 1994, direct detection of the Stokes' parameters representing the three coordinate axis of the Poincare sphere would require three outputs (S1, S2, S3) to uniquely determine any transmitted symbol on the Poincare's sphere. This is different from the two diodes (Figures 23A (180a/180b)) and Nand gates producing two outputs processing shown by Hait, which could not uniquely determine received symbols in three dimensional Poincare's sphere. Furthermore, in Hait paragraphs 0165, 0178, 0179 and Figure 23A, two input representing constructive interference (108) and destructive interference (110) were required for direct detection, while direct detection for polarization demodulation required only a single input of the received light.

Hait data processing is very different from that disclosed

and claimed in the pending application (New Claims 39, 66). In Hait's paragraph 0102, Figure 2 (36) was responsible to deliver data 38 reconstituted from original data 22. Since the decoders (14a, 14b, 14c) would have reversed the encoding operation (12a, 12b, 12c), no additional processing was required for 36. However, the receiver data processor (page 19, line 21 to page 20, line 1) from the pending application had to demultiplex the received TDM data from the received spatial and temporal data channels into multiple channels.

The rejection of Claims 2, 3, 7-13, 30 and 32 under 35 USC §103(a) as obvious over the Hait publication is also respectfully traversed. Regarding Claims 2 and 30, Hait did mention hardware transparency in the digital or analog domain (paragraph 0283 and 0311). However, if we examined the specifics of implementation as described in paragraph 0308, Hait disclosed two modulators (412, 418) in the transmit side but only one demodulator (422) in the receive side. Assuming the demodulator would perform inverse operation as the two modulators combined. According to Hait, the so-called preconditioning modulator would function by continually varying the value of a parameter used for modulation. Thus demodulator 422 would conduct the opposite. For one of ordinary skill in the art, this feature automatically eliminated most form of digital modulation, which does not require continuous change of parameters during the symbol time of the "1" and the "0" states.

It also excluded multi-parameter modulation like polarization modulation using Stokes' parameters {S0, S1, S2, S3}, which was used in the pending application (page 20, lines 13-16; also page 14, lines 13-22). Thus Hait is inapplicable to the claims (New Claims 40, 68) as now presented.

Nor does Hait produce the plurality of polarization levels the Examiner refers to. As explained above for Claims 2 and 30, the implementation of the modulators disclosed by Hait limited its usage to analog and single parameter types of modulation, which has no conflicts with this pending application of multi-parameter (Stokes) (page 20, lines 13-16; also page 14, lines 13-22), digital modulation of multiple polarization states on the Poincare sphere (page 19, lines 8-12; also page 17, lines 2-5).

Hait is also inapplicable to Claims 8, 9, 10 and 32 as interpreted by the Examiner. In paragraph 0032, Hait summarized his invention, which pertained to the encoding and decoding of parent signal to produce time-delayed daughter signals, was compatible with a variety of modulation types. Since his applications and the specific interconnections of his optical sources were different from the pending application and claims (page 1, lines 9-13; also Figure 1A, 1B and 1C). Thus Hait is inapplicable.

Regarding the rejection of Claims 7 and 11, since Hait's invention pertained to the encoding and decoding of parent

signal to produce time-delayed daughter signals. For people of ordinary skill in the art, it would not be obvious for them to associate direct electro-optical modulation with the encoding and decoding of delayed signals.

The rejection of Claim 12 is also incorrect. On page 14, line 18 of the pending application, a reference to the receiver implementation was given. From Figure 3 of the cited reference paper by Sergio Benedetto, "Multilevel Polarization Shift Keying: Optimum Receiver Structure and Performance Evaluation," IEEE Trans. On Comm., March 1994, direct detection of the Stokes' parameters representing the three coordinate axis of the Pointcare sphere would require three outputs (S1, S2, S3) to uniquely determine any transmitted symbol on the Poincare's sphere. This is different from the two diodes (Figures 23A (180a/180b)) and Nand gates producing two outputs processing shown by Hait, which could not uniquely determine received symbols in three dimensional Poincare's sphere as disclosed and claimed (New Claim 50) by applicant. Furthermore, in Hait paragraphs 0165, 0178, 0179 and Figure 23A, two inputs representing constructive interference (108) and destructive interference (110) were required for direct detection, while direct detection for polarization demodulation required only a single input of the received light. It should be very clear for one of ordinary skills in the art; Hait concept of photonic detection was not comparable to that disclosed and claimed in

the pending application.

The Examiner is incorrect in his rejection of Claim 13 as paragraph 0184 did not talk about coherent optical demodulation. Rather, he described the spectra of the sources and the encoding of delayed daughter pulses. Persons of ordinary skill in the art will observe no connections of Hait patent to the pending application (New Claim 51).

The rejection of Claim 4 under 35 USC §103(a) over Hait in view of Jopson et al, U.S. Patent No. 6,385,356, is also respectfully traversed. Hait is inapplicable for the numerous reasons spelled out above. Nor does applicant see how Jopson is combinable at all much less with Hait to produce the novel invention as now claimed. Jopson's invention pertains to the measurement and compensation of Polarization Mode Dispersion (PMD), which arises from the frequency/wavelength dependent of polarization through different devices. It affects optical telecom system by limiting the transmission speed and distance. Jopson disclosed a technique to measure PMD as seen in the setup of Figure 5. In col. 5, lines 1-2, "Figure 5 is a block diagram of an apparatus for measuring PMD in an optical fiber". Furthermore, details of measurement operation were described in col. 3, lines 31 to 50. Thus, Jopson Figure 5 did not relate to the polarization demodulators and Stokes parameters in Claim 4 (New Claim 42) of the pending application.

The rejection of Claims 5 and 16 under 35 USC §103(b) in

view of Naito, U.S. Patent No. 6,427,043, is traversed. Hait is inapplicable for the numerous reasons given above. With this conclusion in mind, even though Naito had previously disclosed optical amplifiers to extend transmission distance of fiber-optic cables as part of his wavelength dispersion compensation scheme (col. 5, lines 1-15), it will be highly unlikely for anyone to go from optical amplifier as part of a dispersion compensation scheme to the idea of using polarization modulation in conjunction with TDM/WDM multiplexing scheme disclosed and claimed (New Claims 43, 54) in the pending application (page 2, line 23 to page 4, line 22).

The rejection of Claims 6, 17 and 31 under 35 USC §103(a) over Hait in view of Tajima Publication No. 2001/0030787 is traversed. Hait is inapplicable and not properly combinable with any of the references to produce anything much less applicant's invention for the reasons given above. With this conclusion in mind, Tajima's invention of n x n optical switch could be used for optical cross-connect of transmit and receive in a WDM system to reuse the wavelengths (Figures 3 (33) paragraph 0038). However, it will be impossible for anyone to go from optical cross-connect to the idea of using polarization modulation in conjunction with TDM/WDM multiplexing scheme disclosed in the pending application (page 2, line 23 to page 4, line 22).

The rejection of Claims 14 and 33 under 35 USC §103(a) over

Hait in view of Hansen, U.S. Patent No. 6,078,418 is traversed. Hait is inapplicable to the claims for the reasons given. Hansen's invention pertained to the compensation of dispersion by using the control signal generated from a homodyne detector by comparing the phase of the input versus output optical signal of a dispersive device (col. 5, lines 20-40; col. 8, lines 45-52). This application led to a different implementation than the classical homodyne detection technique used in telecommunications. The classical homodyne detection used a local optical source to match the incoming wavelength of the optical signal at the receiver. This classical technique was used in the pending application (New Claims 52, 71). On page 14, line 18 of the pending application, a reference to the receiver implementation was given. Additional information of homodyne detection is available from Figure 3 of the cited reference paper by Sergio Benedetto, "Multilevel Polarization Shift Keying: Optimum Receiver Structure and Performance Evaluation," IEEE Trans. On Comm., March 1994; and Optical Communications by Gagliardi, page 178, Wiley Interscience, New York, 1976.

With this conclusion in mind, for persons of ordinary skills in the art, Hansen's invention of homodyne detection to generate error signal used for the control of dispersive unit plus Hait's invention of optical encoding and decoding would not have produced Claims 14 and 33 (New Claims 52, 71) in the

pending application.

The rejection of Claims 18-27 and 36-38 over Hait in view of Milton, U.S. Patent No. 6,631,018 is respectfully traversed. Again, Hait is inapplicable for the reasons given. Milton disclosed a WDM SONET multiplexing scheme for the ring network (col. 1, lines 23-40). Synchronous Optical Network (SONET) is an optical standard, which defines a hierarchy of optical transmission rates. As shown in Milton (col. 1, lines 43-55), the short-coming of SONET for provisioning data capacity was discussed. This is different from the pending application, which only used a generic TDM scheme (page 3, lines 4-6) to preserve the flexibility in choosing any time-slot sizes, which may not be compatible with the standard SONET standard. Additionally, the pending application used polarization modulation which was not present in Milton.

For persons of ordinary skills in the art, Milton's invention of WDM SONET ring network plus Hait's invention of optical encoding and decoding would not have produced Claims 18 and 21 (New Claims 56, 59) in the pending application.

Nor is Milton combinable with Hait to produce the invention of previous Claims 19 and 22. As shown in Milton Figure 4, a different implementation using Optical Cross-Connects for the ring networks were used as compared to wavelength multiplexers and wavelength demultiplexers shown in Figure 6 of the pending application. Other differences include SONET without specific

modulation in Milton as compared to regular TDM with polarization modulation in the pending application, page 3, lines 4-6.

For persons of ordinary skills in the art, Milton's invention of Optical Cross-Connect and WDM SONET ring network plus Hait's invention of optical encoding and decoding would not have produced Claims 19 and 22 (New Claims 57, 60) in the pending application.

Milton's plurality of Add/Drop nodes would not produce the invention of Claims 20 and 23. As shown in Milton col. 5, lines 65-67, add/drop nodes were used in the optical networks. However, in Figure 4 of Milton, Optical Cross-Connects were used for interconnecting wavelengths as compared to wavelength multiplexers and wavelength demultiplexers in Figure 6 of the pending application. Other differences include SONET without specific modulation in Milton as compared to TDM with polarization modulation in the pending application, page 3, lines 4-6.

Nor does Milton properly apply to Claims 24, 26 and 36. For Claims 24, 26 and 36, as shown in Milton col. 4, lines 50-57, he extended his invention to star optical networks using essentially the same implementation as his ring network. Specifically, in Figure 4 of Milton, Optical Cross-Connects were used for interconnecting wavelengths as compared to wavelength multiplexers and wavelength demultiplexers in Figure 7 of the pending application. Other differences include SONET without

specific modulation in Milton as compared to regular TDM with polarization modulation in the pending application, page 3, lines 4-6.

For persons of ordinary skill in the art, Milton's invention of Optical Cross-Connect with WDM SONET star network plus Hait's invention of optical encoding and decoding would not have produced Claims 24, 26 and 36 (New Claims 62, 64, 74) in the pending application.

From the detailed discussions above it should be clear that Hait does not apply to Claims 25 and 27. Based on Hait and the overwhelming evidence presented showing the vast difference between Hait and the applicant with respect to their design embodiments, design objectives and implementation approaches, no reasonable interpretation would result in a combination of these references that would produce applicant's invention as claimed (New Claims 63, 65).

Regarding Claims 37 and 38, perhaps we could assume the extension of Milton's results to the Data Bus Networks based on the same implementation as his ring network. Specifically, in Figure 4 of Milton, Optical Cross-Connects were used for interconnecting wavelengths as compared to wavelength multiplexers and wavelength demultiplexers in Figure 8 of the pending application. Other differences include SONET without specific modulation in Milton as compared to regular TDM with polarization modulation in the pending application, page 3,

lines 4-6. Thus applicant's invention as now claimed (New Claims 75, 76) would not be obvious over any reasonable combination of Hait with Milton.

The rejection of Claims 15 and 34 under 35 USC §103(a) over Hait in view of Godfrey, U.S. Patent No. 5,060,225 is also respectfully traversed. Hait is inapplicable for the reasons given above. As stated in Claims 15 and 34, the coherent heterodyne demodulation in the pending application claims require a local optical source. The methodology is well-known and details could be found in references by Benedetto, "Multilevel Polarization Shift Keying: Optimum Receiver Structure and Performance Evaluation," IEEE Trans. On Comm., March 1994 and Optical Communications by Gagliardi, pages 173-200, Wiley Interscience, New York, 1976. This is different from Godfrey (col. 6, lines 30-38, Figure 4 (64)) who disclosed a non-coherent scheme using VCOs and hence the name "synthetic heterodyne detection".

With these conclusions in mind, it will be impossible for anyone to go from non-coherent synthetic heterodyne detection to the idea of using polarization modulation in conjunction with TDM/WDM multiplexing scheme disclosed and claimed in the pending application (New Claims 53, 72).

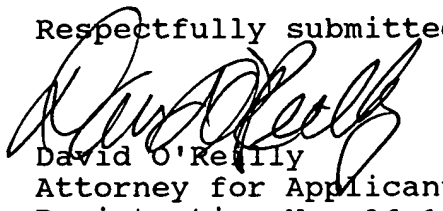
In a sincere attempt to place this application in condition for allowance all the claims have been canceled and new Claims 39 through 76 added to more clearly point out and distinctly

claim the novel features of applicant's invention. Hait is inapplicable for the numerous reasons given above but also because applicant's claims a priority date that precedes the filing date of this reference. In addition the Patent Office Examiner has cited some seven references in rejecting the claims. With the overwhelming evidence gathered by comparing these seven references with the applicant's invention, persons with ordinary skill in the art will conclude that no combination of these references would have produced applicant's invention as claimed.

It is respectfully requested that this response be considered as including a conditional petition for an extension of time sufficient to make this response timely if a Petition for an Extension of Time is inadequate or is omitted. Please charge the costs of any extension or additional extension of time, if needed, to Deposit Account 15-0640.

Reconsideration of this application and allowance of the claims as now submitted are earnestly solicited.

Respectfully submitted,



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